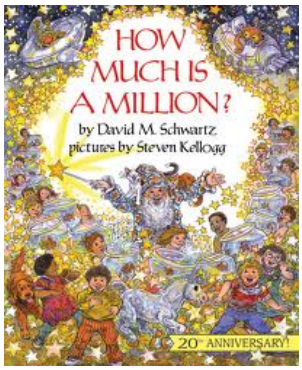
Chapter 9 Exponents & Scientific Notation

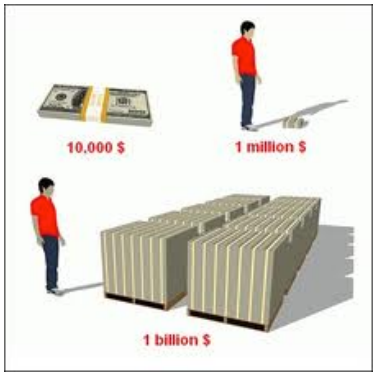
9.5 Reading Scientific Notation

Unit Question: What is the power of powers?

Learner Profile: Reflective

Area of Interaction: Community & Service

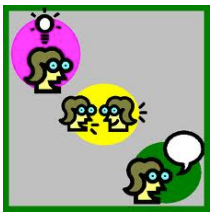




I Can Statement:

I can read numbers that are written in scientific notation.

Think, Pair, Share



How does a calculator display really, really large or really, really small numbers? (You can use a calculator to figure this out.)

Key Idea

Scientific Notation

A number is written in **scientific notation** when it is represented as the product of a factor and a power of 10. The factor must be at least 1 and less than 10.

The factor is at least 1 and less than 10. → 8.3×10^{-7} ← The power of 10 has an integer exponent.

1 Identifying Numbers Written in Scientific Notation

Tell whether the number is written in scientific notation. Explain.

a. 5.9×10^{-6}

∴ The factor is at least 1 and less than 10. The power of 10 has an integer exponent. So, the number is written in scientific notation.

b. 0.9×10^{8}

∴ The factor is less than 1. So, the number is not written in scientific notation.

Key Idea

Writing Numbers in Standard Form

When writing a number from scientific notation to standard form, the absolute value of the exponent tells you how many places to move the decimal point.

- If the exponent is negative, move the decimal point to the left.
- If the exponent is positive, move the decimal point to the right.

2 Writing Numbers in Standard Form

a. Write 3.22×10^{-4} in standard form.

$3.22 \times 10^{-4} = 0.000322$ Move decimal point $|-4| = 4$ places to the left.

4

b. Write 7.9×10^{5} in standard form.

$7.9 \times 10^{5} = 790{,}000$ Move decimal point $|5| = 5$ places to the right.

5

On Your Own

1. Is 12×10^{4} written in scientific notation? Explain.

Write the number in standard form.

2. 6×10^{7} **3.** 9.9×10^{-5} **4.** 1.285×10^{4}

60000000

.00009.9

3 Comparing Numbers in Scientific Notation

An object with a lesser density than water will float. An object with a greater density than water will sink. Use each given density (in kilograms per cubic meter) to explain what happens when you place a brick and an apple in water.

Water: 1.0×10^3 **Brick:** 1.84×10^3 **Apple:** 6.41×10^2

Write each density in standard form.

Water	Brick	Apple
$1.0 \times 10^3 = 1000$	$1.84 \times 10^3 = 1840$	$6.41 \times 10^2 = 641$

∴ The apple is less dense than water, so it will float. The brick is denser than water, so it will sink.

EXAMPLE 4 Real-Life Application

A female flea consumes about 1.4×10^{-5} liter of blood per day.

A dog has 100 female fleas. How many milliliters of blood do the fleas consume per day?

$1.4 \times 10^{-5} \cdot 100 = 0.000014 \cdot 100$ Write in standard form.

$= 0.0014$ Multiply.

∴ The fleas consume about 0.0014 liter, or 1.4 milliliters of blood per day.

On Your Own

5. **WHAT IF?** In Example 3, the density of lead is 1.14×10^4 kilograms per cubic meter. What happens when lead is placed in water?
6. **WHAT IF?** In Example 4, a dog has 75 female fleas. How many milliliters of blood do the fleas consume per day?

Now You're Ready
Exercise 27

I Can Statement:

I can read numbers that are written in scientific notation.

Assignment:

Textbook p.380-381
16-30even